



Use the Right Grade Component for the Application

Reducing Cost of Ownership

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The Hard Way





The
Right
Tools..
Much
Easier





Trends

- **Secretary of Defense William Perry**
 - “Best commercial practices”
 - Eliminate non-productive MIL-specs
 - Streamline acquisition process
- **Use of commercial components in all environments including “harsh” environments**
- **“Up screening” (aka “uprating”, “retesting”)**
- **Hi-rel system manufacturers have more latitude**



The objectives

- **Reduce component acquisition costs**
- **Eliminate waste**
- **Access to the latest semiconductor technologies**



The consumer market

- **Product lifecycles are short...1-3 years**
- **Designs are optimized for limited temperatures**
- **Functionality and costs are driven by consumer applications**
- **Designs and processes, even for the same function, change frequently and without notice**
- **Low volume products are not cost effective**



The Hi-rel market

- Long product life cycles...10-25 years
- Designed and tested for extended temp range
- Designed and tested for harsh environments
- Design change control
- Low volume

Component grades

	Temp Range	Packaging	Add'l Features	Quals	Typ Life (yrs)
Commercial	0 → 70	Plastic	None	None	1-3
Industrial	-20 → +85 -40 → +85	Plastic Hermetic	None	None	3-5
Automotive	-20 → +85 -40 → +85	Plastic	PCN	AEC Customer	5-8
Military	-55 → +125	Hermetic	Mil Screening PCN Std Part No.	/883 SMD Jan B QML -Mil	15-40
Space	-55 → +125	Hermetic	Space Screening Rad Assurance PCN Std. Part No.	Jan-S QML V QML VR -MLS	15-40



Up screening – what is it?

- **Testing components (usually commercial grade) outside the specified electrical or temperature limits in the hope that it just might work**
- **Often done by both users and subcontractors**
...not by the component manufacturers



Up screening – hidden costs

- Labor for testing
- Purchase of test equipment
- Test program development
- Engineering costs
- Scrap of rejected parts
- Verification and qualification
- Supply over long system life time
- Field failures
- Potential liability costs
- “Ruggedized” system enclosures



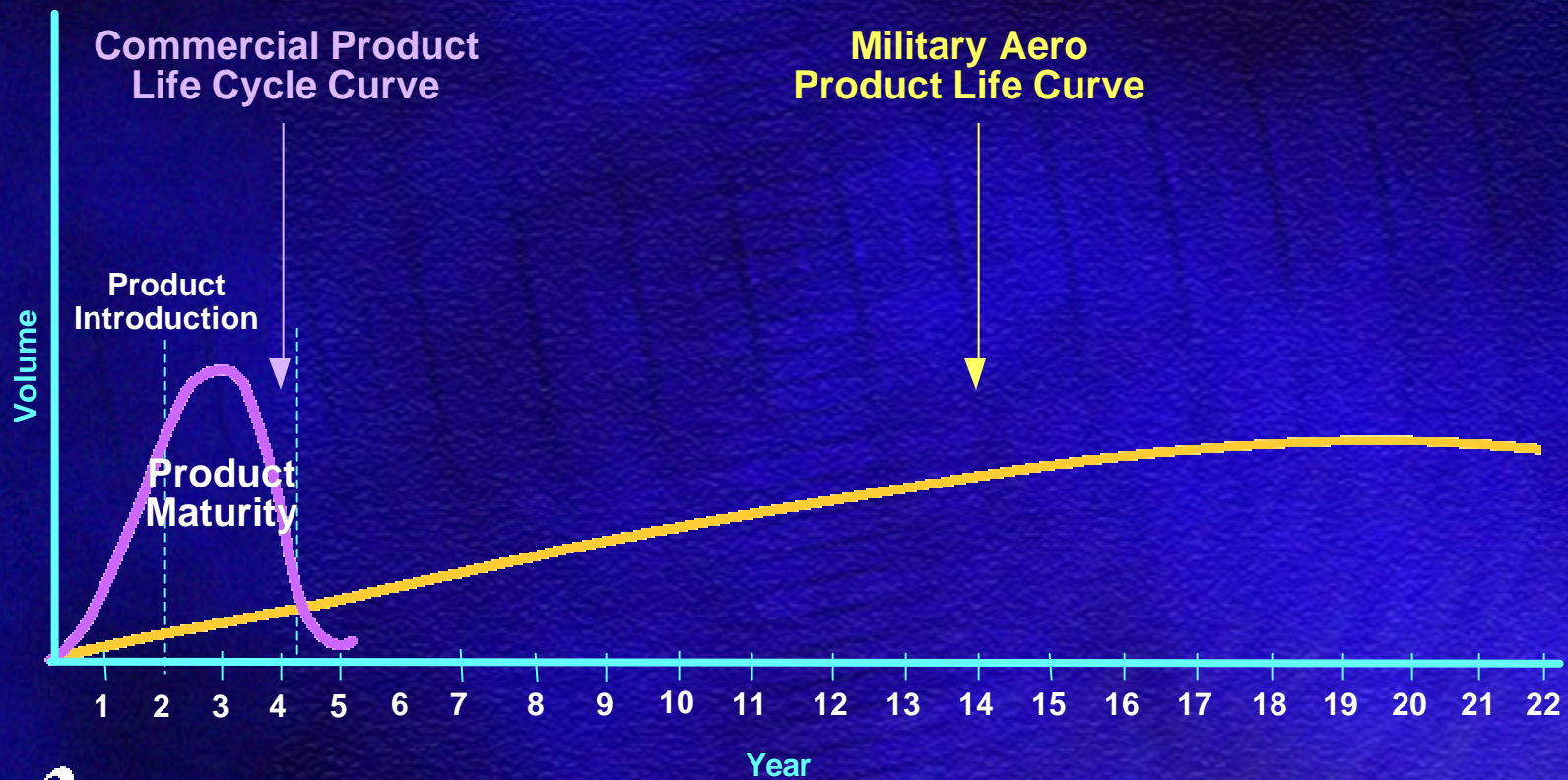
Up screening – risks

- **Poor fault coverage**
- **Knowledge of component architecture or characteristics affecting quality and reliability**
...worse problem for complex parts
- **Frequent design and process changes**
...often without notice
- **Defects or reliability issues from add'l handling**
- **System failure**



Life Cycles

Hi-rel vs commercial





Life cycles *NSC hi-rel examples*

<u>Part No.</u>	<u>Intro'd</u>	<u>Peak Volume</u>	<u>Today Volume</u>
LM139/883	1975	1.1M/yr	0.4M/yr
DS26LS31/883	1984	1.0M/yr	0.3M/yr
LM124/883	1977	0.8M/yr	0.2M/yr

**Programs: Patriot, Tomahawk, Apache
Trident, F16, F18, etc.**



Life cycles *Hidden costs*

- **Additional component evaluation and qualification costs**
- **System re-qualification costs**
- **Procurement costs of obsolete components**
- **Potentially reassembling a new design team**



Warranty and liability issues

- **No component manufacturer will warranty products used outside the specified operating conditions, and**
- **The user will assume full liability**



Recommendations

- **Use components designed and tested by the manufacturer for the application**
- **Select vendors with dedicated hi-rel organizations**
 - **Contact them if you need help finding the right part**
- **If you must improvise, make sure you thoroughly understand the added cost, obsolesce, risk, and liability issues**
- **The right part usually results in lowest system cost**



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